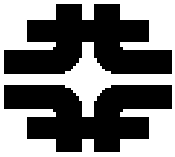
SMC Checkout Sheet

Technician Name:_____

SMC Board #:_____



Fermilab

Particle Physics Division/CDF Upgrade Project

Checkout Procedure for SMC, Shower Max Crate Controller

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I. SMC Pre Burn In Checkout

_____ Visual Board Inspection (Reference known good board)

- Examine solder connections front and rear under the microscope.
- Verify that the correct components were installed.
- Verify that the components are oriented correctly.
- Install PLD's U43 and U62.

_____ Setup for the pre-burn in checks. Refer to Figure I.1.

- Install the SMC under test into the Test Adapter.
- Connect the SMDI PC Interface unit to the SMC through J1 and J2.
- Connect the PC to the SMDI using the USB-LPT cable.
- Connect +5 VDC, +15 VDC and -15 VDC power to the Test Adapter.
- Connect the Ohm/Volt/Amp Tester to the Test Adapter using the 10 conductor ribbon cable.

_____ Check the Resistance between Power and Ground (DC Power **OFF**).

- On the Ohm/Volt/Amp Tester, start with both switches in position 1.
- Connect a multimeter to the banana jacks with the meter set to measure Ohms.
- Switch the power supply on and observe that the OHM CHECK led is lit, and also note that the green power indicating leds on the SMC module faceplate are not lit.
- Using the Table I.1 ensure that the resistance measured at switch positions 1 - 7 of the OHM CHECK switch fall within the expected range.

Table I.1

Switch Pos.	**Points Measured**	**Expected Range**
1	DGND to AGND	20 to 25 Ohms (power connector off Test Adapter)
2	+5 VDC to DGND	> 50 Ohms
3	+15 VDC to AGND	> 1K Ohms
4	-15 VDC to AGND	> 1K Ohms
5	+5 VDC to +15VDC	> 10K Ohms
6	+5VDC to -15VDC	> 10K Ohms
7	+15 VDC to -15VDC	> 10K Ohms

_____ Check Board SupplyVoltages

- Set the multimeter to measure DC Volts.
- On the Ohm/Volt/Amp Tester, put the left switch in position 8.
- The green power indicating leds on the face of the SMC should be lit.

- Using the Table I.2 ensure that the voltages measured at switch positions 2,3 and 4 of the VOLT CHECK switch fall within the expected range.

Table I.2

Switch Pos.	Points Measured	Expected Range
2	+5 VDC	+5.0 to +5.2 Volts
3	+15 VDC	+15.0 to +15. 2 Volts
4	-15 VDC	-15.0 to -15. 2 Volts

_____ Check Board Supply Currents

- On the Ohm/Volt/Amp Tester, put the left switch in position 8 and the right switch in position 7.
- Set the multimeter to measure DC Amps. This will also involve moving the positive lead to another hole in the face of the multimeter
- Using the Table I.3 ensure that the amperes measured at switch positions 8,9 and 10 of the AMP CHECK switch fall within the expected range.

Table I.3

Switch Pos.	Points Measured	Expected Range
8	+5 VDC	< 0.400 Amps
9	+15 VDC	< 0.040 Amps
10	-15 VDC	< 0.040 Amps

_____ Power Board for 1.5 Hours before DAC Calibration

- Place boards in a “Power Only” crate to allow warm-up of the DAC.
- REMEMBER to power down the crate when installing or removing a module.

_____ Perform the DAC Calibration

- Remove an SMC from the “Power Only” crate and install in the standard crate or Test Adapter and power up.
- Connect the SMDI PC Interface unit to the SMC through J1.
- Connect the gain adjust push button adapter to test port TST4.
- Connect a 6 ½ digit voltmeter to the +/- SMVCAL pins of the Test Adapter Board and insert into an empty slot.
- From the PC test software macro window execute the following one line macro: SetDAC[0x8000];
- Note the reading on the voltmeter.

Note: To make voltage measurements to 6 ½ digit accuracy the meter may take as long as 6 seconds to update. Always wait 6 seconds after any adjustment to see the full effect.

- Adjust the DAC output voltage for a reading as close to 0.000,000 Volts as possible by adjusting the switches of U69 and possibly U70. Note you will need to execute the macro SetDAC [0x8000] after each switch adjustment. The switches represent a binary bias value to the incoming 16 bit DAC setting.
- From the PC test software macro window execute the following one line macro: SetDAC[0xC000];
- Note the reading on the voltmeter.
- Adjust the DAC output voltage for a reading as close to +1.250,000 Volts as possible by momentarily pressing the gain adjust push buttons. Note the buttons should not be depressed for more than 1 second at a time. One button will drive the meter reading up the other will drive it down. The macro command **does not** need to be executed after each adjustment of the gain.
- Repeat the bias and gain adjustments as many times as necessary until no further adjustment is required.

II. SMC Burn In Procedure

_____ Install up to eight SMC's in the "Power Only" crate in the oven.

_____ Adjust the oven control settings for 50 degC.

_____ Shut down the oven at the end of the day.

III. SMC Post Burn In Checkout

_____ Setup to run the SMDI Automated checks and attach the generated report. Refer to Figure III.1.

- Connect the SMDI PC Interface unit to the SMC through J1 and J2.
- Connect the PC to the SMDI using the USB-LPT cable.
- Ensure that Jumper S22 is installed on the SMC Board under test.
- Connect the 20 pin ribbon cable from the HP34970A to test port TST3.
- Connect the 50 pin ribbon cable from the HP34970A to the backplane monitor board.

- Connect the two wire DAC output probe connection from the HP34970A to the SMVCAL wires split off from the 50 pin ribbon cable.
- Connect the HP34970A to the PC via the RS232 connection.
- From the PC test software type into the macro window the following:

  ProductionTests;

  Follow this with a couple carriage returns and be sure not to forget the semicolon at the end of the word.
- Under the menu item "Macro" select "Run".
- When the dialog box appears enter the SMC Board identification number.
- Click the button for each test. They need not be pressed in any order and test can be run any number of times before pressing the "Generate Report" button.
- Using the scope and differential probe and the dialog box for the Backplane test, observe the following signals by measuring them on the dual row connector of the Backplane Tester Board:
  SM_RESET
  SM_L1A
  SMCLOCK

- Note: In the DAC Output Test you will need to click "GO" to start this test and "QUIT" when the test is completed.
- When all tests have been completed click on "Generate Report".
- Note that for the DAC Output results the Slope Error should be less than 0.05% and the Intercept Error should be less than 100 uV.
- Before closing the Excel worksheet print both the sheet containing the linear regression on the DAC data and the sheet containing the Pass/Fail results.
- After the Excel worksheet has been closed switch to the Windows Explorer window and backup the worksheet in a network folder or to a floppy disk.

_____ Setup and run the full load system tests using the SMXR

This is the final check before releasing the board for installation on the detector. The SMC is operated in a fully loaded crate for one hours. During this period the system uses the SMC in performing repeated data transmit requests using digital SQUID’s and PATTEN diagnostics mode transmissions. A second set of tests use real SQUID's to perform QIE calibrations.

Checkout Sheet
Technician Name: _____
SMC #: _____

Note any test which initially fails and the action taken to repair it:

Name of Failing Test: _____
Repair Steps: _____
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Name of Failing Test: _____
Repair Steps: _____
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Repair Steps: _____

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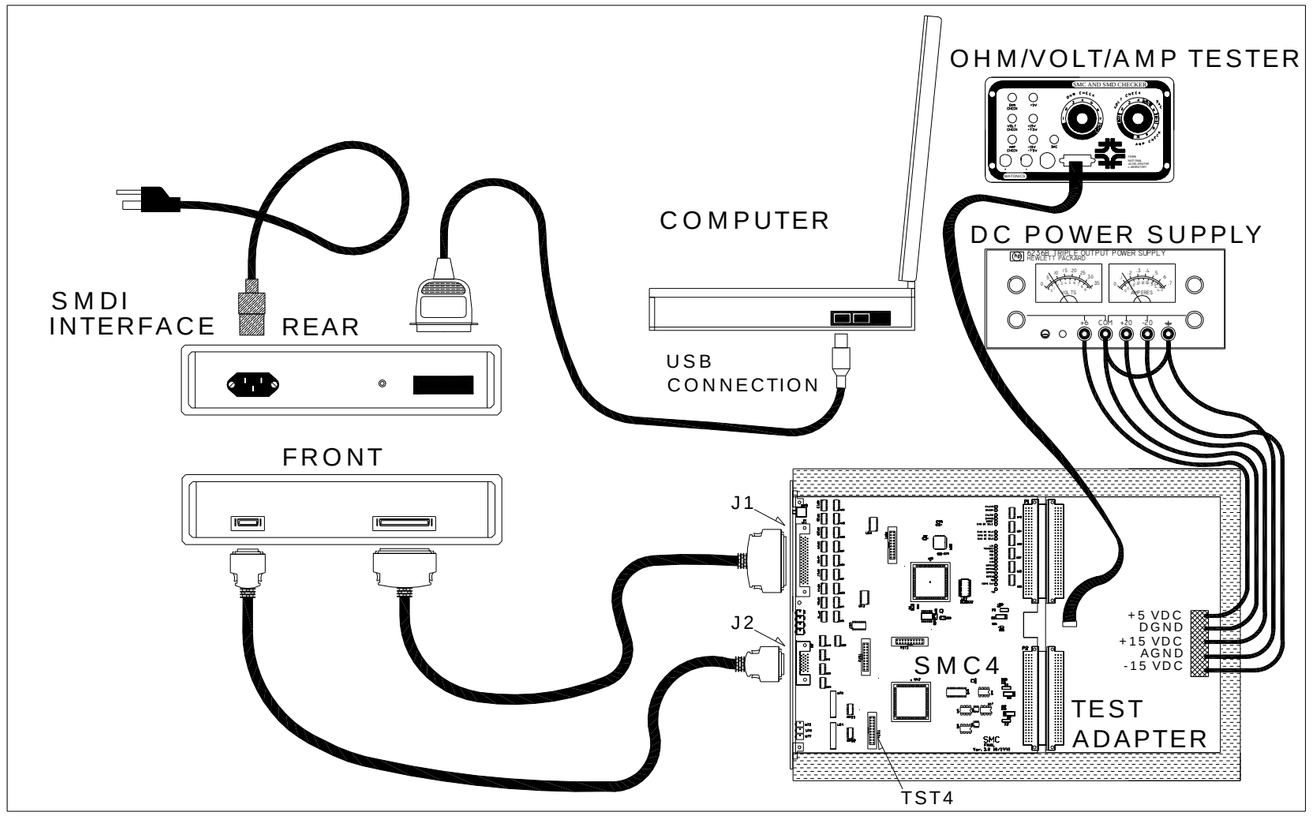
OHM/VOLT/AMP TESTER
COMPUTER
DC POWER SUPPLY
SMDI
INTERFACE
REAR
USB
CONNECTION
FRONT
J1
J2
+5 VDC
DGND
+15 VDC
AGND
-15 VDC
SMC4
TEST
ADAPTER
TST4

Figure I.1

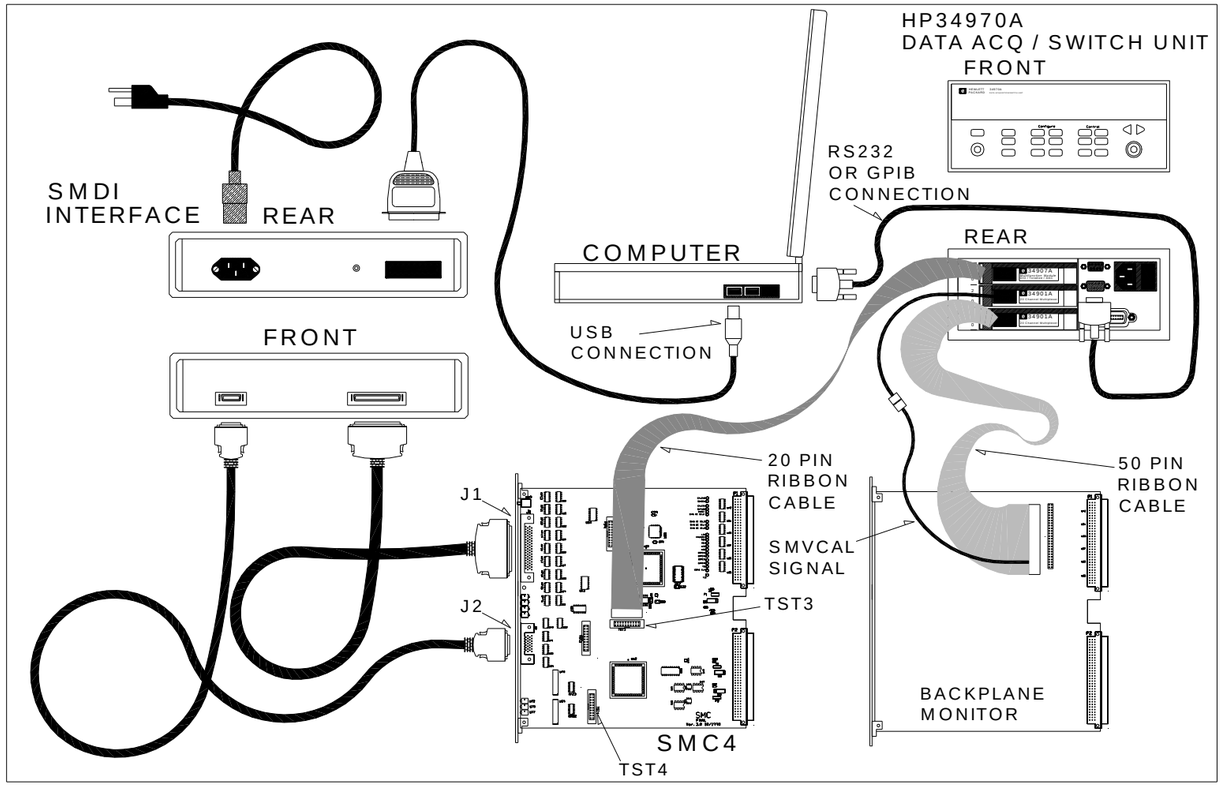
HP34970A
DATA ACQ / SWITCH UNIT
FRONT
RS232
OR GPIB
CONNECTION
REAR
SMDI
INTERFACE
REAR
COMPUTER
USB
CONNECTION
FRONT
20 PIN
RIBBON
CABLE
50 PIN
RIBBON
CABLE
J1
J2
SMVCAL
SIGNAL
TST3
BACKPLANE
MONITOR
SMC4
TST4

Figure III.1